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(19)

(54) FOUNDRY CORE CARRIERS

(71) We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, Imperial Chemical House, Millbank, London SW1P 3JF, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to core carriers for use in foundries.

In casting metals to form shaped articles, it is frequently necessary to include a core in the mould in order to form a hollow casting such as a pipe. The core is usually formed from a mixture of sand and a binder which may be a resin or drying oil composition which, on curing at a suitable temperature, binds the sand particles together to produce a form stable core. The mixture of sand and binder is pressed to form a core having green strength and this core is heated to cure the binder. Curing of the binder is effected by transporting the core through an oven maintained at a suitable temperature, usually in the range 150—220°C depending on the binder. The cores are frequently transported through the oven on a core carrier which is effective to support the core and prevent it becoming deformed during its passage through the oven.

According to the present invention there is provided a core carrier having a recess corresponding to the shape of the core and formed of a plastics material which does not melt below 200°C.

Plastics materials having suitable melting points include polymers of 4-methyl pentene-1, aromatic polymers and polyimides.

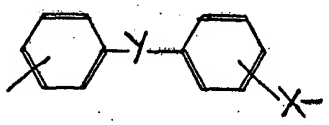
A wide range of polymers, including copolymers, of 4-methyl pentene-1 are described in British Patent Specifications 942 297; 968 935; 1 001 801; 1 014 886; 1 085 914 and 1 253 833.

Aromatic polymers and methods for making them, are described in British Patent Specifications 971 227; 1 016 245; 1 060 546; 1 078 234; 1 102 679; 1 109 842; 1 122 192; 1 124 200; 1 133 561; 1 153 035; 1 153 528; 1 164 817; 1 177 183 and 1 234 301; Belgian Specification 741 965; Canadian Specification 847 963; United States Specification 3 432 468; Netherlands Specifications 69 03070 and 70 11346; German Specification 1 938 806 and Swiss Specification 491 981.

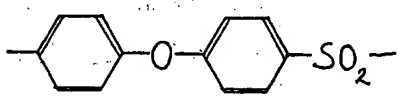
The aromatic polymers described in the above mentioned specifications comprise repeating units of the formula

—Ar—X—

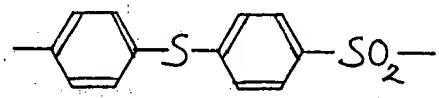
in which Ar is a bivalent aromatic radical and X is a —CO— and —SO_2— group and each may vary from unit to unit in the polymer chain (so as to form copolymers of various kinds). Thermoplastic aromatic polymers generally have at least some units of the structure

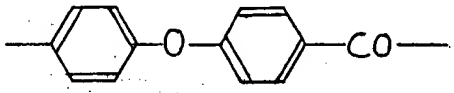


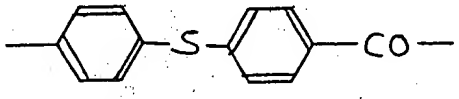
in which Y is oxygen or sulphur or the residue of an aromatic diol such as 4,4'-bisphenol. One example of such a polymer has repeating units of the formula



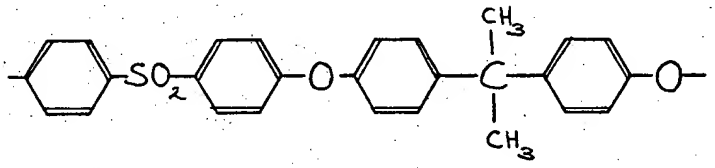
others have repeating units of the formulae



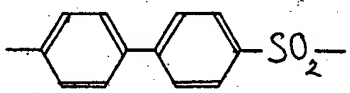




and others (which are commercially available in the United States of America) are said to have repeating units of the formula



(Union Carbide Corporation) or copolymerised units in various proportions of the formulae



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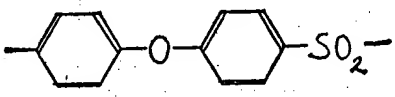
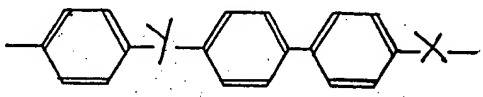
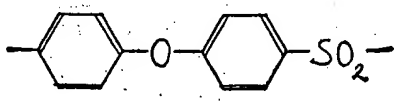


(Minnesota Mining and Manufacturing Company). Another group of aromatic polymers has repeating units of the formula



(where Y is oxygen or sulphur and X is —CO— or —SO_2—) which may be copolymerised with units of other formulae given above. Preferred aromatic polymers have a reduced viscosity of at least 0.3 (as measured at 25°C on a solution of the polymer in dimethyl formamide containing 1 g. of polymer in 100 cm^3 of solution) and have repeating units of the formula



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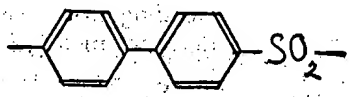

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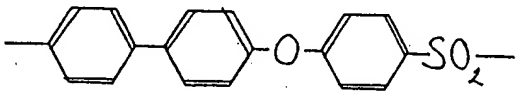


because these polymers have high softening point, low creep and good resistance to oxidation and thus are particularly suitable for use as core carriers in accordance with the present invention.

The core carrier may be formed of a thermoformed foil of the plastics material or may be formed from paper or board coated with the plastics material. Core carriers in accordance with the present invention may be used for the transport of small cores of weights up to about one kgm.

The use of core carriers in accordance with the present invention has several advantages over cast aluminium core carriers used hitherto.

Thus, cast aluminium core carriers represent a substantial capital investment when a new core design is being introduced. Furthermore, aluminium core carriers are in many instances larger than the core being supported and thus have a high heat capacity relative to the core resulting in an uneven cure of the cores and the use of considerable quantities of fuel to heat the carrier. Due to the binders exuding the core may stick to the carrier resulting in damage to the carrier and the core disintegrating.

The use of light core carriers formed of plastics materials means that little heat is used to heat the carrier and the curing of the core is less uneven. Furthermore, carriers are readily formed from foil by a thermoforming operation and such carriers do not require a large capital investment.

Thus, the use of core carriers formed of plastics material can require less capital investment and allows for the use of less fuel to heat the oven or alternatively for a shorter residence time of the core in the oven.

The cores which may be used with the core carriers of the present invention are preferably relatively small, for example cores for casting pipe bends. The core binders may be those commonly used. For use in iron foundries the binder can be a drying oil/starch or oleoresinous/starch mix which require oven temperatures of 220°C or marginally higher. In other foundries, for example, aluminium foundries, binder requiring lower curing temperatures such as 170°C can be used, suitable binders including urea-formaldehyde mixes.

Carriers in accordance with the present invention are readily formed from a foil of the appropriate plastics material. The carrier may comprise a foil of the plastics material having a recess corresponding to the shape of the core to be supported, the core resting in the recess during the passage of the core and carrier through the oven.

One embodiment of the invention will now be described with reference to the drawings accompanying the provisional specification wherein

Figure 1 is a perspective view of a typical pipe bend core;

Figure 2 is a perspective view of a metal core carrier; and

Figure 3 is a perspective view of a core carrier in accordance with the present invention.

The pipe bend core has a central section 1 which includes the bend and two end sections 2 and 3 of smaller diameter than the central section 1. The core carrier of Figure 2 is formed of a block of metal 4, which can be aluminium or any other suitable metal. The core carrier of Figure 3 is formed of a sheet of a suitable plastics material 5. The plastics material is selected to be capable of withstanding the temperature in the curing oven and can be a polymer of 4-methyl pentene-1, an aromatic polymer such as a polysulphone or polyimide.

The core carriers are provided with a half impression 6 of the pipe bend core so that the core is supported during its passage through the oven.

Core carriers in accordance with the present invention are readily formed and can be used on a disposable basis, possibly after being cycled through the oven several times.

WHAT WE CLAIM IS:—

1. A carrier for supporting a foundry core whilst it is transported through an oven, wherein said carrier has a recess corresponding to the shape of the foundry core and is formed of a plastics material which does not melt below 200°C.

2. A core carrier according to claim 1 wherein the plastics material is a polymer of 4-methyl pentene-1, an aromatic polymer or a polyimide.

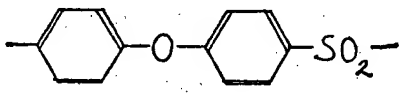
3. A core carrier according to claim 2 wherein the aromatic polymer comprises repeating units of the formula

—Ar—X—

in which Ar is a bivalent aromatic radical and X is a —CO— and —SO_2— group and each may vary from unit to unit in the polymer chain.

4. A core carrier according to claim 2 or 3 wherein the aromatic polymer is a polysulphone.

5. A core carrier according to claim 4 wherein the aromatic polymer has a reduced viscosity of at least 0.3 and repeating units of the formula



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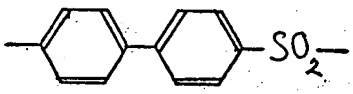

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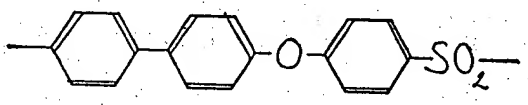

6. A core carrier as claimed in any of claims 1 to 5 which is formed of a thermoformed foil of the plastics material or from paper or board coated with the plastics material.

7. A core carrier as claimed in claim 6 which comprises a foil of the plastics material having a recess corresponding to the shape of the core to be supported.

8. A core carrier substantially as hereinbefore described with reference to Figure 3 of the drawings accompanying the provisional specification.

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Agent for the Applicants.

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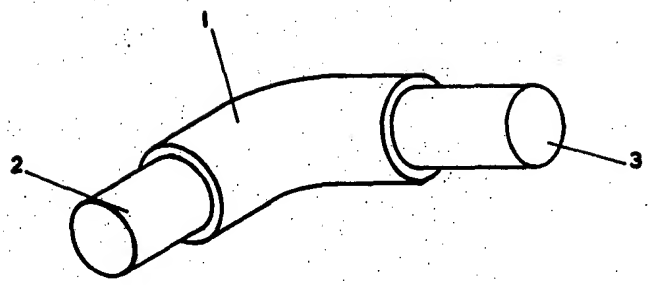

FIG 1

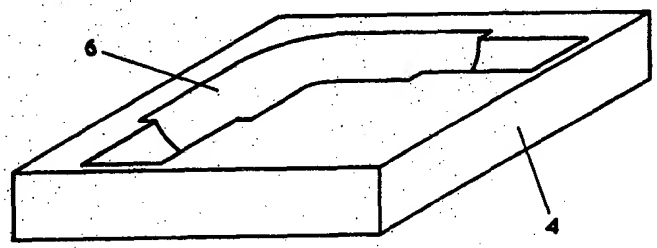

FIG 2

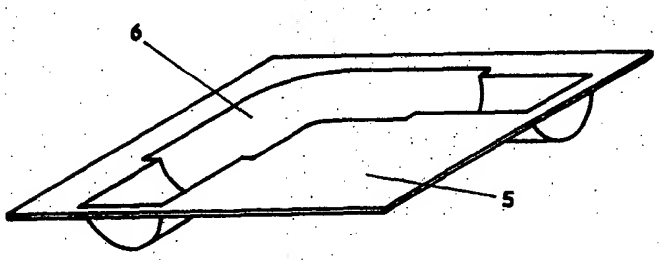

FIG 3